THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. An optical filter having a plurality of cavities, one or more of said cavities including a spacer of thickness greater than 7 μm.

2. An optical filter according to claim 1 wherein said spacer defines two opposed surfaces each having a plurality of thin layers disposed thereon, wherein the total number of thin layers per cavity is less than 35.

3. An optical filter according to any one of the preceding claims wherein the thickness of the spacer is greater than 10 μm.

4. An optical filter according to any one of the preceding claims wherein the thickness of the spacer is greater than 20 μm.

5. An optical filter according to any one of the preceding claims wherein the thickness of the spacer is greater than 50 μm.

6. An optical filter according to any one of the preceding claims wherein the thickness of the spacer is greater than 100 μm.

7. An optical filter according to any one of the preceding claims wherein the average number of thin layers per cavity is less than 30.

8. An optical filter according to any one of the preceding claims wherein the average number of thin layers per cavity is less than 25.

9. An optical filter according to any one of the preceding claims wherein the average number of thin layers per cavity is less than 15.

10. An optical filter according to any one of the preceding claims wherein said filter has a pass band of less than 5nm.

11. An optical filter according to any one of the preceding claims wherein said filter has a pass band of less than 1nm.

12. An optical filter according to any one of the preceding claims wherein said filter has a pass band of less than 0.5nm.

13. An optical filter according to any one of the preceding claims wherein said filter is adapted to receive a dense wavelength division multiplexed optical signal including a plurality of channels within a predetermined frequency range.

14. An optical filter according to claim 13 wherein said predetermine frequency range is approximately 1520nm to 1570nm.

15. An optical filter according to any one of the preceding claims wherein at least one of the cavities is formed in accordance with the following formula:

(HL)^6 HMH (LH)^6

where H is a quarter wavelength layer of material having a refractive index of approximately 2.065, L is a quarter wavelength layer of material having a refractive index of approximately 1.465 and M is a spacer of approximately 21μm thickness and having an approximate refractive index of 1.465.

16. An optical filter according to any one of the preceding claims wherein said optical filter is in accordance with the following formula:

((HL)^6 HMH (LH)^6 L)^3

where H is a quarter wavelength layer of material having a refractive index of approximately 2.065, L is a quarter wavelength layer of material having a refractive index of approximately 1.465 and M is a spacer of approximately 21μm thickness and having an approximate refractive index of 1.465.

17. An optical filter according to claim 15 or 16 wherein the maximum allowable uniformity error in the thickness of each of said thin layers is within the range of 1 part in 50,000 to 4 parts in 10,000.

18. An optical filter according to any one of the preceding claims wherein the maximum allowable absorption in each of said thin layers corresponds to an extinction coefficient of between 1×10^{-4} and 1×10^{-5}.

19. An optical filter according to any one of the preceding claims wherein the maximum allowable uniformity error in the thickness of each of said spacers is less than or equal to 0.53nm.

20. An optical filter according to any one of claims 1 to 14 wherein at least one of the cavities is formed in accordance with the following formula:

(HL)^4 HMH (LH)^4

where H is a quarter wavelength layer of material having a refractive index of approximately 2.065, L is a quarter wavelength layer of material having a refractive index of approximately 1.465 and M is a spacer of approximately 106μm thickness and having an approximate refractive index of 1.465.

21. An optical filter according to any one of claims 1 to 14 wherein said optical filter is in accordance with the following formula:

((HL)^4 HMH (LH)^4 L)^3

where H is a quarter wavelength layer of material having a refractive index of approximately 2.065, L is a quarter wavelength layer of material having a refractive index of approximately 1.465 and M is a spacer of approximately 106μm thickness and having an approximate refractive index of 1.465.

22. An optical filter according to claim 20 or 21 wherein said optical filter is used in combination with a blocking filter having a passband of approximately 12nm so as to block adjacent side orders.

23. An optical filter according to any one of claims 20 to 22 wherein the maximum allowable uniformity error in the thickness of each of said thin layers is within the range of 1 part in 50,000 to 3 parts in 2,000.

24. An optical filter according to any one of claims 1 to 14 wherein at least one of the cavities is formed in accordance with the following formula:

(HL)^4 HMH (LH)^4

where H is a quarter wavelength layer of material having a refractive index of approximately 2.065, L is a quarter wavelength layer of material having a refractive index of approximately 1.465 and M is a spacer of approximately 529μm thickness and having an approximate refractive index of 1.465.

25. An optical filter according to any one of claims 1 to 14 wherein said optical filter is in accordance with the following formula:

((HL)^4 HMH (LH)^4 L)^3

where H is a quarter wavelength layer of material having a refractive index of approximately 2.065, L is a quarter wavelength layer of material having a refractive index of approximately 1.465 and M is a spacer of approximately 529μm thickness and having an approximate refractive index of 1.465.

26. An optical filter according to claim 24 or 25 wherein said optical filter is used in combination with a blocking filter having a passband of approximately 2.4nm so as to block adjacent side orders.

27. An optical filter according to any one of claims 24 to 26 wherein said filter has a passband of less than 0.05nm.

28. An optical filter according to any one of claims 24 to 27 wherein the maximum allowable uniformity error in the thickness of each of said thin layers is within the range of 1 part in 50,000 to 1.2 parts in 1,000.

29. An optical filter according to any one of claims 24 to 28 wherein the maximum allowable uniformity error in the thickness of each of said spacers is less than or equal to 1.6nm.

30. An optical filter according to any one of claims 1 to 14 wherein said optical filter is in accordance with the following formula:

(HL)^2 HMH (LH)^2 L ((HL)^3 HMH (LH)^3 L)^2 (HL)^2 HMH (LH)^2

where H is a quarter wavelength layer of material having a refractive index of approximately 2.065, L is a quarter wavelength layer of material having a refractive index

index of approximately 1.465 and M is a spacer of approximately 1.32mm thickness and having an approximate refractive index of 1.465.

31. An optical filter according to claim 30 wherein said optical filter is used in combination with a blocking filter having a passband of approximately 1nm so as to block adjacent side orders.

32. An optical filter according to claim 30 or 31 wherein the maximum allowable uniformity error in the thickness of each of said thin layers is within the range of 1 part in 50,000 to 3 parts in 1,000.

33. An optical filter according to any one of claims 30 to 31 wherein the maximum allowable uniformity error in the thickness of each of said spacers is less than or equal to 3.96nm.

34. An optical filter according to any one of claims 1 to 14 wherein said optical filter is in accordance with the following formula:

((HL)^7 HMH (LH)^7 L) ((HL)^8 HMH (LH)^8 L)^2 ((HL)^7 HMH (LH)^7)

where H is a quarter wavelength layer of material having a refractive index of approximately 2.065, L is a quarter wavelength layer of material having a refractive index of approximately 1.465 and M is a spacer of approximately 0.8mm thickness and having an approximate refractive index of 1.465.

35. An optical filter according to claim 30 or 31 wherein the maximum allowable uniformity error in the thickness of each of said thin layers is within the range of 1 part in 50,000 to 1 part in 10,000.

36. An optical filter according to any one of claims 30 to 31 wherein the maximum allowable uniformity error in the thickness of each of said spacers is less than or equal to 0.11nm.

37. An optical filter according to any one of claims 34 to 36 wherein said filter has a passband of approximately 0.002nm.

38. An optical filter adapted to receive a dense wavelength division multiplexed optical signal including a plurality of channels ranging in frequency between

approximately 1520nm and 1570nm, said filter being adapted to output a single channel of less than 1nm width, said filter having a plurality of cavities, one or more of said cavities including a spacer of thickness greater than 7 μm and wherein said spacer defines two opposed surfaces each having a plurality of thin layers disposed thereon, wherein the average number of thin layers per cavity is less than 35.

39. An optical interleaver having a plurality of cavities, one or more of said cavities including a spacer of thickness greater than 7 μm.

40. An optical interleaver according to claim 39 wherein said spacer defines two opposed surfaces each having a plurality of thin layers disposed thereon, wherein the average number of thin layers per cavity is less than 35.

41. An optical interleaver according to claim 40 wherein the average number of thin layers per cavity is less than 30.

42. An optical interleaver according to any one of claims 39 to 41 wherein the thickness of the spacer is greater than 10 μm.

43. An optical interleaver according to any one of claims 39 to 41 wherein the thickness of the spacer is greater than 20 μm.

44. An optical interleaver according to any one of claims 39 to 41 wherein the thickness of the spacer is greater than 50 μm.

45. An optical interleaver according to any one of claims 39 to 41 wherein the thickness of the spacer is greater than 100 μm.

46. An optical interleaver according to any one of claims 39 to 45 wherein the total number of thin layers per cavity is less than 25.

47. An optical interleaver according to any one of claims 39 to 45 wherein the total number of thin layers per cavity is less than 15.

48. An optical interleaver according to any one of claims 39 to 45 wherein the total number of thin layers per cavity is less than 10.

49. An optical interleaver according to any one of the preceding claims wherein said interleaver is adapted to receive a dense wavelength division multiplexed optical input signal including a plurality of channels within a predetermined frequency range and to split said input into an output of at least two sub-sets of channels.

50. An optical interleaver according claim 50 wherein each of said channels has a bandwidth of less than 5μm.

51. An optical interleaver according to claim 50 wherein each of said channels has a bandwidth of less than 1μm.

52. An optical interleaver according to claim 50 wherein each of said channels has a bandwidth of less than 0.5μm.

53. An optical interleaver according to claim 50 wherein said predetermined frequency range is approximately 1520nm to 1570nm.

54. An optical interleaver according to any one of claims 39 to 53 wherein at least one of the cavities is formed in accordance with the following formula:

HLHM

where H is a quarter wavelength layer of material having a refractive index of approximately 2.065, L is a quarter wavelength layer of material having a refractive index of approximately 1.465 and M is a spacer of approximately 0.8mm thickness and having an approximate refractive index of 1.465.

55. An optical interleaver according to any one of claims 39 to 54 wherein said interleaver is formed in accordance with the following formula:

(HLHM)^10 HLH

where H is a quarter wavelength layer of material having a refractive index of approximately 2.065, L is a quarter wavelength layer of material having a refractive index of approximately 1.465 and M is a spacer of approximately 0.8mm thickness and having an approximate refractive index of 1.465.

56. An optical interleaver according to any one of claims 39 to 55 wherein the maximum allowable uniformity error in the thickness of each of said thin layers is equal to or less than 5nm.

57. An optical interleaver according to any one of claims 39 to 56 wherein the maximum allowable uniformity error in the thickness of each of said spacers is equal to or less than 8nm.

58. An optical interleaver adapted to receive a dense wavelength division multiplexed optical input signal including a plurality of channels ranging in frequency between approximately 1520nm and 1570nm, said interleaver being adapted to split said input into an output of at least two sub-sets of channels, wherein each channel has a bandwidth in the range of about 16nm to less than 1nm, said interleaver having a plurality of cavities, one or more of said cavities including a spacer of thickness greater than 7 μm and wherein said spacer defines two opposed surfaces each having a plurality of thin layers disposed thereon, wherein the average number of thin layers per cavity is less than 35.

59. A method of manufacturing an optical filter in accordance with any one of claims 1 to 38, said method including the steps of:

producing a plurality of spacers by optically polishing a substrate, wherein at least one of said spacers has a thickness of greater than 7μm;

using thin film deposition to deposit a plurality of thin layers onto each of said spacers to form cavities, whereby the average number of thin layers per cavity is less than 35; and

optically contacting said plurality of cavities to form said filter.

60. A method of manufacturing an optical filter in accordance with any one of claims 1 to 38, said method including the steps of:

a) utilising thick film deposition to produce a spacer having a thickness of greater than 7μm;

b) utilising thin film deposition to deposit a plurality of thin layers onto said spacer to form a cavity, the average number of thin layers per cavity being less than 35;

c) repeating combinations of steps a) and b) so as to form said filter.

61. A method of manufacturing an optical interleaver in accordance with any one of claims 39 to 58, said method including the steps of:

producing a plurality of spacers by optically polishing a substrate, wherein at least one of said spacers has a thickness of greater than 7μm;

using thin film deposition to deposit a plurality of thin layers onto each of said spacers to form cavities, whereby the average number of thin layers per cavity is less than 35; and

optically contacting said plurality of cavities to form said interleaver.

62. A method of manufacturing an optical interleaver in accordance with any one of claims 39 to 58, said method including the steps of:

a) utilising thick film deposition to produce a spacer having a thickness of greater than 7μm;

b) utilising thin film deposition to deposit a plurality of thin layers onto said spacer to form a cavity, the average number of thin layers per cavity being less than 35; and

c) repeating combinations of steps a) and b) so as to form said interleaver.